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Sect#: #:

UNIVERSITY OF BAHRAIN
DEPARTMENT OF COMPUTER SCIENCE

COLLEGE OF INFORMATION TECHNOLOGY
2nd SEMESTER 2012/2013

ITCS 242: ASSEMBLY PROGRAMMING

DATE: MARCH 27, 2013

FIRST TEST

QUESTION ONE: Write a complete assembly program that:

[20 pts]

- Defines an array ISA consisting of 50 elements of signed double words.
- Fills all elements of array ISA with values by randomly generating 50 double word integers.
- Displays in HEX all elements of array ISA as words separated by a space.
- Displays all elements of array ISA as bytes in signed decimal one value per line.
- Shifts all elements of array ISA down in the memory by 40 bytes.

INCLUDE Irvine32.inc

.Data

ISA sdword 50 dup(?)
byte 40 dup(?)

.Code

main proc

mov esi, 0

mov ecx, lengthof ISA

L1: CALL Random32

mov ISA[esi], eax

add esi, 4

loop L1

mov esi, offset ISA

mov ecx, lengthof ISA * 2

mov ebx, type ISA / 2

CALL DumpMem

CALL CrLf

mov ecx, sizeof ISA

lea esi, ISA

L2: mov eax, byte ptr [esi]

CALL writeInt

CALL CrLf

inc esi

loop L2

DRAGON

continue

lea esi, ISA

lea edi, ISA + 40

mov ecx, sizeof ISA

L3: mov AL, byte ptr [esi]

mov byte ptr [edi], AL

inc esi

inc edi

loop L3

Exit

main ENDP

END main

esi
ISA

edi

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QUESTION TWO:

{14 points}

Choose the BEST correct answer for each of the following questions and **write its letter symbol down in the table shown below**

- 1) The register the must be used to store the loop repetition counter when using LOOP instruction is:
☒ a) ECX b) EBX c) ESI d) EIP e) None
- 2) The type of the SOURCE operand used in the instruction: MOV BX, sizeof HI; is:
☒ a) Immediate b) Direct c) Indexed d) indirect e) None
- 3) If the physical address is 40000H and the offset value is 39C0, then the segment value will be:
 a) 4C64 b) 4C640 ☒ c) 3C64 d) 3C640 e) None
- 4) The instruction that subtracts the contents of CX register from the word pointed by ebx register is:
 a) SUB CX, [EBX] ☒ b) SUB ebx, CX c) SUB [ebx], CX
 d) SUB WORD PTR EBX, CX ☒ e) None
- 5) The instruction used to decrement a word variable pointed to by a register ESI is:
 a) DEC [ESI] ☒ b) DEC WORD PTR [ESI] c) DEC ESI
 d) SUB word EBX, 1 e) None
- 6) The 8-bit value 10001010 represents unsigned decimal value ____ and signed decimal value ____
 a) -138, 118 ☒ b) 138, -118 c) 138, -138 d) 118, -118 e) None
- 7) The directive that defines an array OUR consisting of 24 signed bytes all initialized with -50 is:
 a) OUR sbyte 24 dup(-50) b) OUR sdword 24 dup(-50)
 c) OUR SWORD 24 dup(0A0H) d) OUR sbyte 24 dup("-50") ☒ e) None
- 8) The step in the instruction cycle that determines where to store the result is:
 a) STORE RESULT ☒ b) INSTRUCTION DECODE c) NEXT INSTRUCTION
 d) OPERANDS FETCH e) None
- 9) The statement that produces syntax error during assembly process is:
 a) INC AX b) MOVZX EBX, CL c) ADD AX, BX
☒ d) MOV SX EBX, EAX e) MOV DH, 20H
- 10) The statement that produces syntax error during assembly process is:
 a) MOV AX, [EBX] b) MOVZX EBX, CL c) INC AX
☒ d) MOV [EBX], [EAX] e) MOV DH, 20H
- 11) The instruction that stores 0 in the memory word pointed by esi register is:
 a) MOV esi, 0 b) MOV [esi], 0 c) SUB [esi], [esi]
 d) SUB esi, esi ☒ e) None
- 12) The statement that produces syntax error during assembly process is:
 a) ADD EAX, EBX b) SUB EAX, 20H c) XCHG AX, BX
☒ d) SUB [EBX], AX e) None
- 13) The register that always contains the offset address of the next instruction to be executed is:
 a) ESI b) EBX c) ECX ☒ d) EIP e) None
- 14) If a PC has 24 data lines and 8GB of main memory, the minimum number of address lines is
 a) 8 ☒ b) 33 c) 32 d) 64 e) None

Question #	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Answer	a	a	c	e	b	b	e	b	d	d	e	e	d	b

QUESTION THREE:

{16 points}

- (a) Given the following data definitions: `UU sword 3C9FH, 4A2FH, ...`
Write **No more than 6 instructions** to add 1 to the first byte and subtract 1 from the second byte in each word of array `UU`.

```

mov esi, 0
mov ecx, lengthof UU
L0: inc byte ptr UU[esi]
    dec byte ptr UU[esi+1]
    add esi, 2
    loop L0
    
```

- (b) Given: `U sbyte -1, -2, 3AH, ...`

NEW `Sword ? : lengthof U/2 dup(?)`

Write **No more than 8 instructions** to pack every pair of neighboring bytes of array `U` into a word and store the resulting values in array `NEW`. (You have to define the array `NEW` as needed).

```

mov ecx, lengthof U/2
mov esi, 0
LX: mov ax, word ptr U[esi]
    mov NEW[esi], ax
    add esi, 2
    loop LX
    
```

- (c) Given: `MAN SDWORD 2A3B4C5DH, 1F8C9E12H, ...;`

Write **No more than 8 instructions** to store in `AX` register the sum of all bytes of `MAN`.

```

mov ecx, sizeof MAN
mov ax, 0
mov esi, 0
L2: movsx bx, byte ptr MAN[esi]
    add ax, bx
    inc esi
    loop L2
    
```

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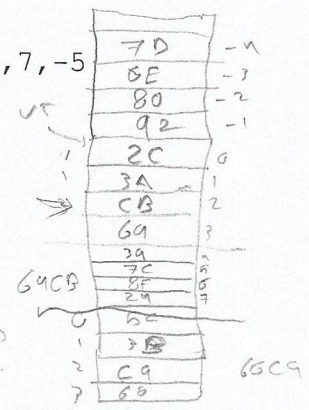
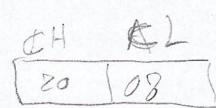
QUESTION FOUR:

[12 pts]

Carefully study the following data definitions and instructions then:

- Choose the BEST correct answer for each of the following 5 questions.

T1	BYTE	5CH, 3BH, 0C9H, 66H, 9AH, 22H, 7FH, 9AH	8
T2	SWORD	69CFH, 12A8H, 6F7FH, 6ACAH, 81CFH, 456FH, 6E7DH, 9280H	16
UT	DWORD	69CB3A2CH, 248F7C39H, 33446672H, 725A91680H, 56F14B19H,	20
CCC	EQU	\$-T2	
FIRE	SWORD	20, ?, 3 dup(?, 9, 4, 2 dup(-1, ?, 66, 22), 8, 5), 9, 7, -5	
MOV	BX, WORD PTR T1		
MOV	AX, WORD PTR UT+2		
MOV	DX, WORD PTR UT-4		
MOV	CH, SIZEOF UT		
MOV	CL, LENGTHOF T2		
MOVSX	DI, T1+2		



- The value assigned to the constant name CCC is:
☒ a) 36 b) 36H c) 11 d) 26 e) None
- The register AX will contain:
 a) 725AH ☒ b) 69CBH c) 5A72H d) 3390H e) None
- The register CX will contain:
 a) 2008H b) 1620H c) Undefined ☒ d) 1408H e) None
- The register DX will contain:
 a) 7D6EH b) 7D45H ☒ c) 6E7DH d) 457DH e) None
- The register DI will contain:
 a) 3BC9H b) C966H c) 00C9H ☒ d) FFC9H ☒ e) None

- Using the above data definitions and instructions, answer all questions from 6 to 12

- The instruction that replaces the value in seventh byte in UT with 8F is mov byte ptr UT[7], 8FH
- The instruction that stores in ebx the first 2 words of T2 is mov ebx, dword ptr T2
- The instruction that creates a pointer to the last item in UT is lea esi, UT + sizeof UT - 4
- The instruction that stores in BX the number of bytes of UT is mov BX, sizeof UT
- The instruction that stores 0 in the fourth byte of T1 is mov T1[3], 0
- The number of bytes occupied by the fire directive is 88
- The instruction: MOV DI, lengthof T2 * type T2; stores 10 H in DI register.

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